

# Critical infrastructure impacts in small towns following the Kaikōura earthquake, and pre- and post- event adaptations to manage these impacts

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National  
**SCIENCE**  
Challenges

RESILIENCE  
TO NATURE'S  
CHALLENGES

Kia manawarao  
– Ngā Ākina o  
Te Ao Tūroa



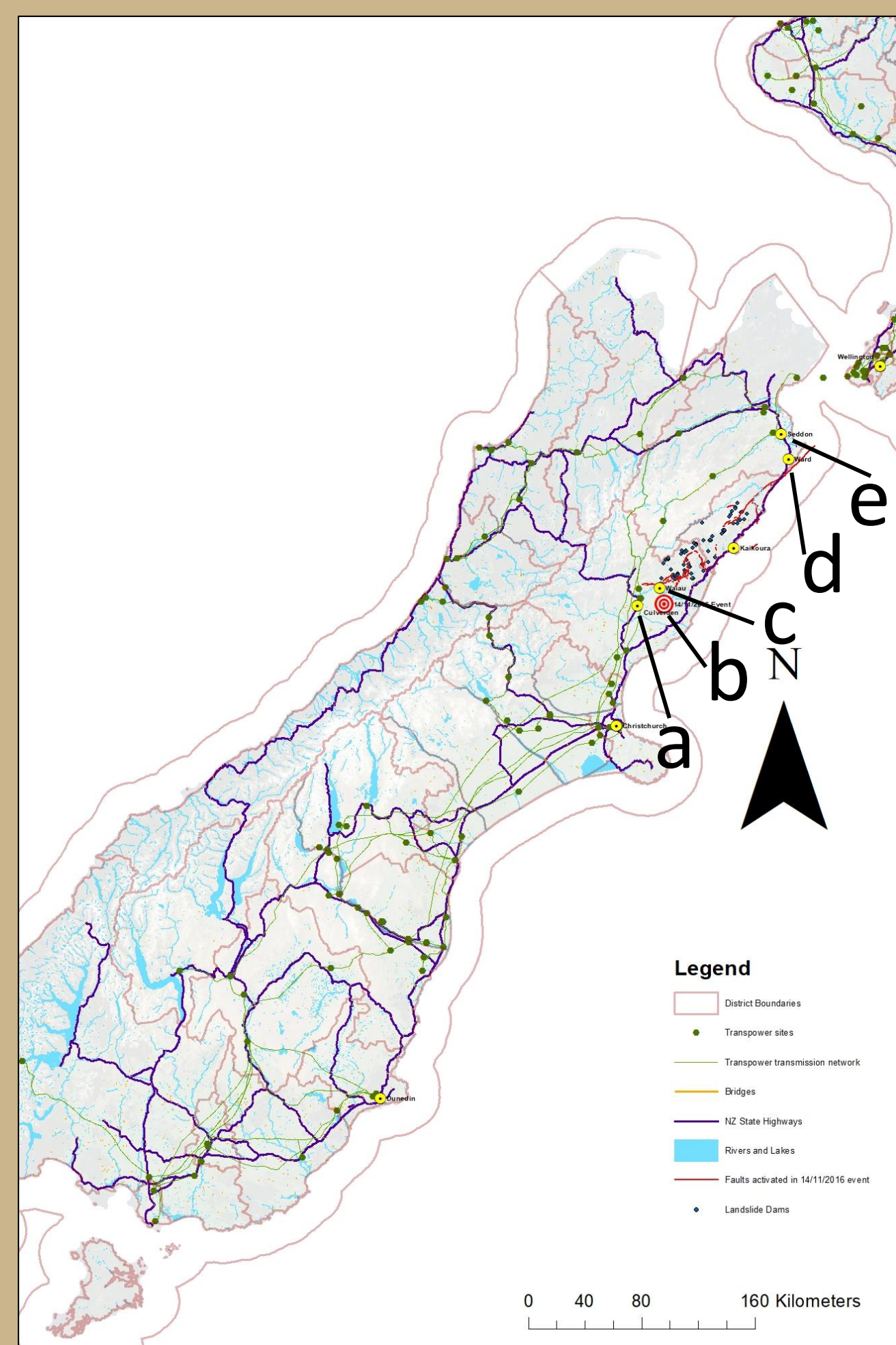
QuakeCoRE  
NZ Centre for Earthquake Resilience  
Te Hiraanga Aū



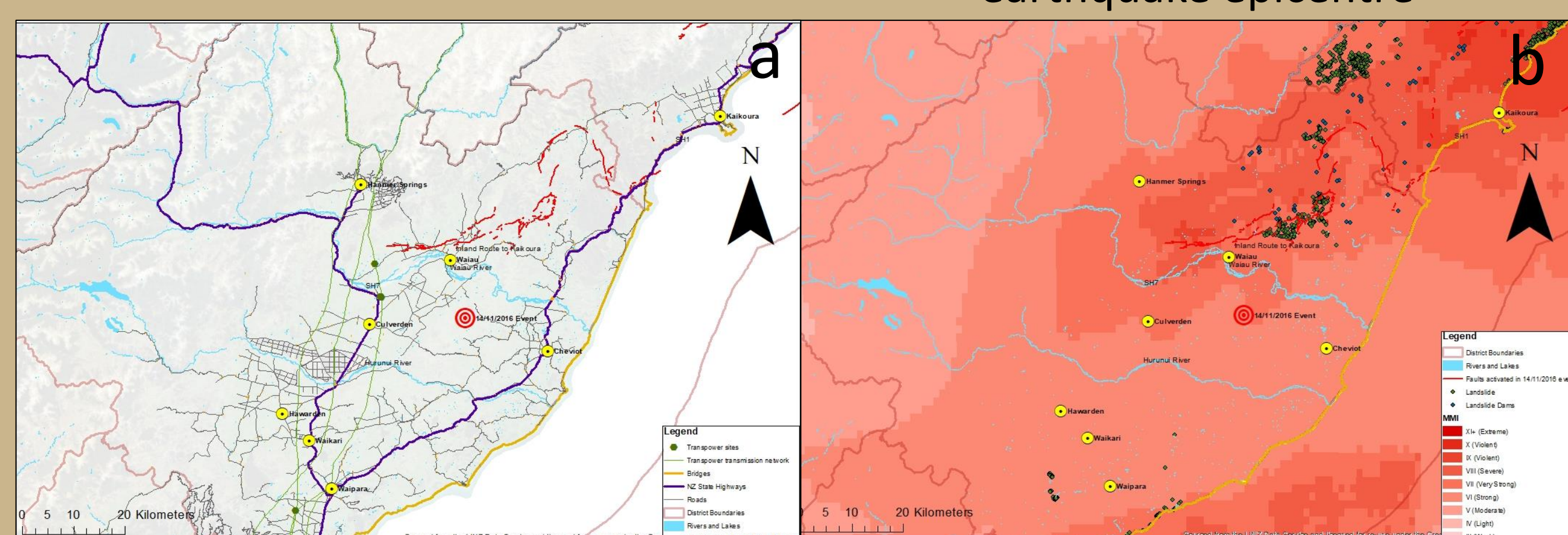
## Background and methodology

The Mw 7.8, 14<sup>th</sup> November 2016 earthquake centred (item b, *figure 1*) in the Hurunui District of the South Island, New Zealand, damaged critical infrastructure across North Canterbury and Marlborough.

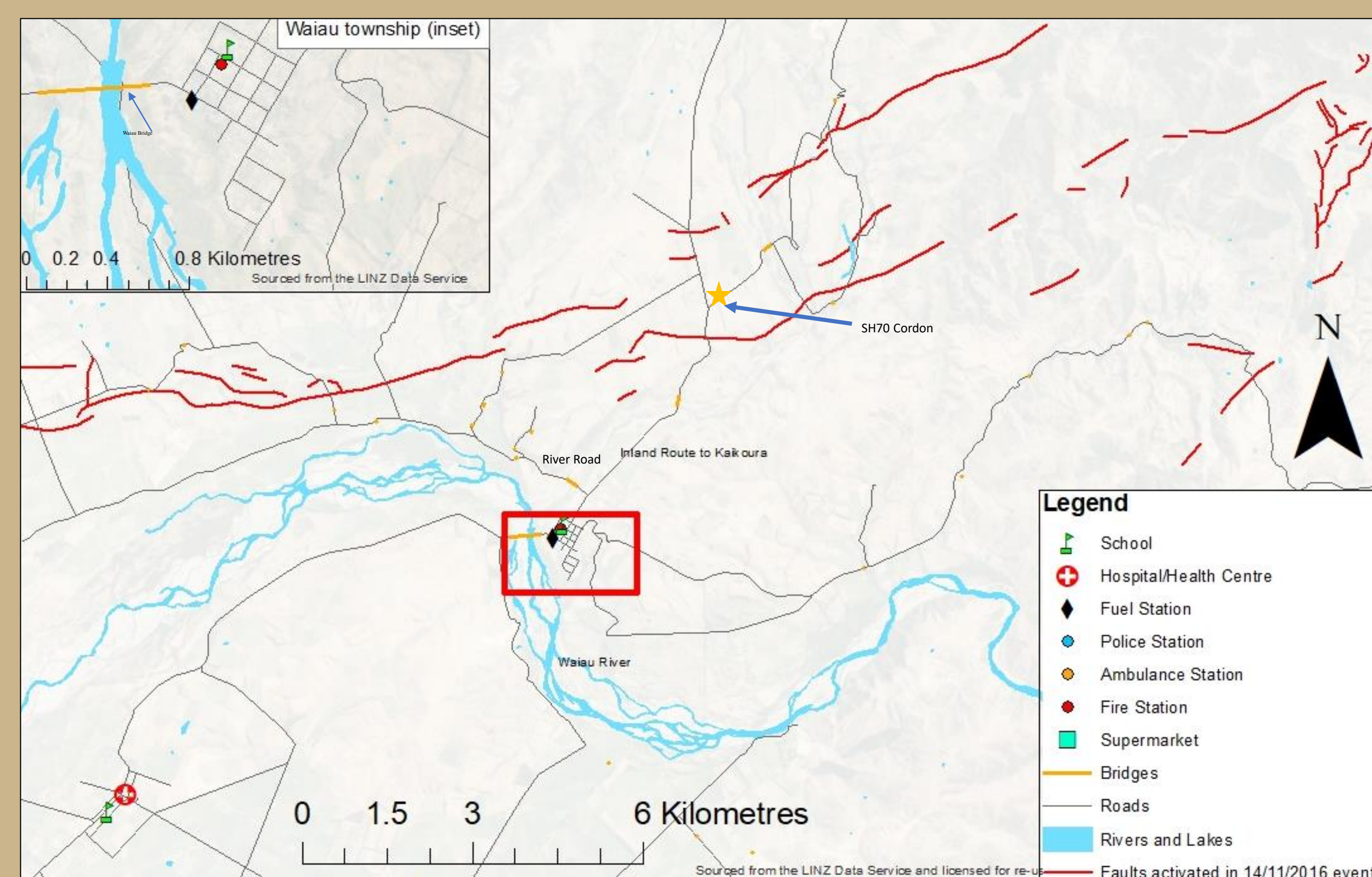
We investigate the impacts to infrastructure and adaptations to the resulting service disruption in four small rural towns (*figure 1*): Culverden (a), Waiau (c), Ward (d) and Seddon (e). This is accomplished through literary research, interviews and geospatial analysis. Illustrating our methods, we have displayed here a Hurunui District hazard map (*figure 2b*) and select infrastructure inventories (*figures 2a, 3*).



**Figure 1:** South Island, New Zealand showing locations of case study towns and earthquake epicentre



**Figure 2:** Hurunui district infrastructure inventory (a) with Hurunui district (b) hazard map

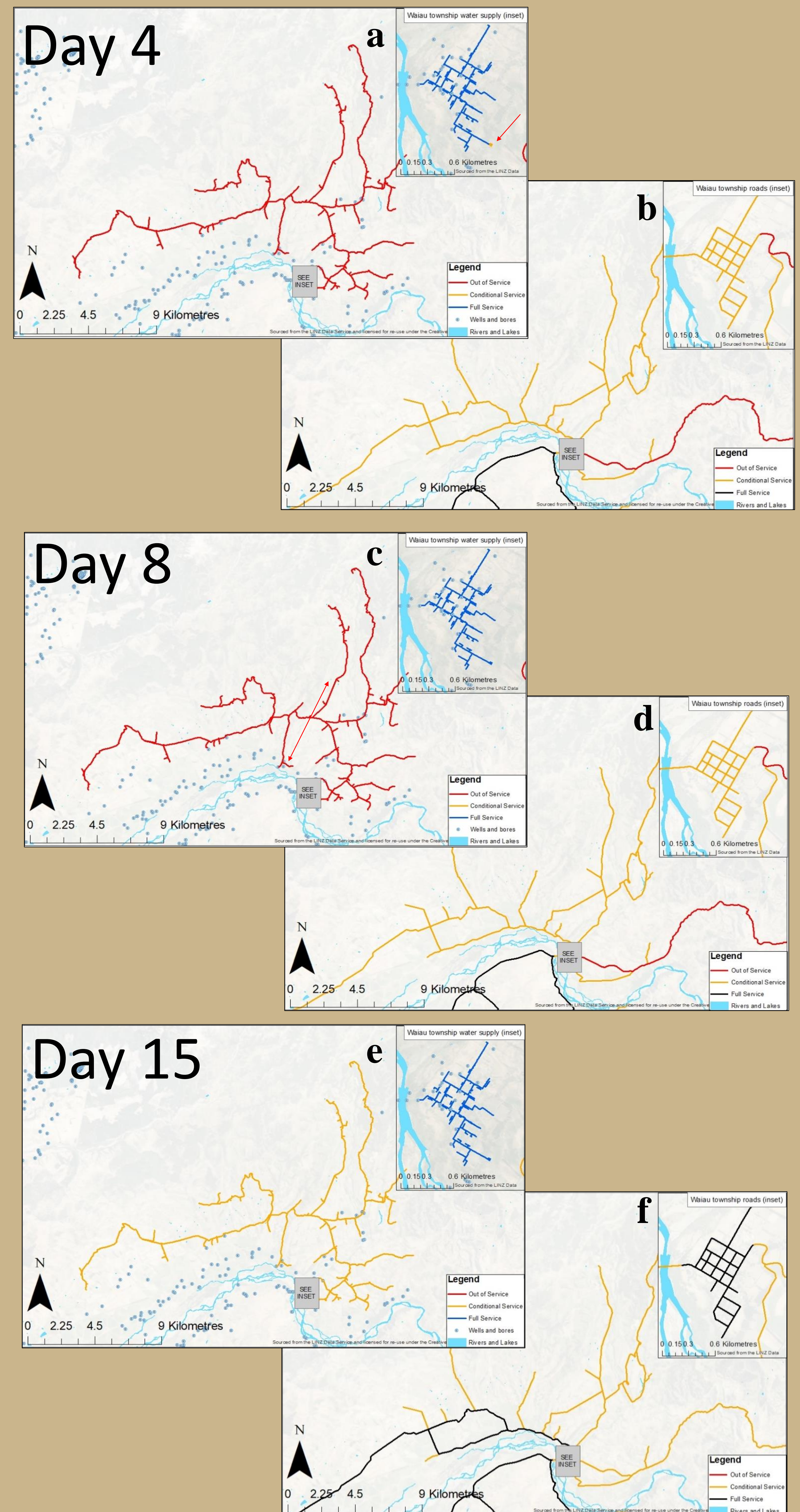


**Figure 3:** Waiau infrastructure inventory with Waiau township as inset.

## Excerpts from Preliminary Results (Waiau)

- Water supply network restoration in Waiau was heavily dependent on road access (*figures 4a-f*) and to a lesser extent, power supply. Town water supply storage tanks were damaged in the quake, so to keep town supply water running during repair a mobile chlorination plant was connected to the Waiau River intake (marked on *figure 4c*) and directly fed the town.
- The style of damage to bridges (shifting off abutments) tended to stop large vehicles for an extended period but remained usable by foot traffic soon after the earthquake.
- Through interviews it was confirmed that locals bypassed Waiau's Inland Road cordon (marked in *figure 3*) via private property, risking their own wellbeing for that of stock and other rural livelihoods. Such an adaptation to disruption in service was not recorded in any official reports in our research. This reaffirms the need for engaging with community members in all stages of disaster response, recovery and assessment in order to bolster resilience.

## Excerpts from Preliminary Results cont. (Waiau)



**Figure 4:** Excerpt of Waiau water/roading time series analysis depicting level of service (LoS) between 4 and 15 days following the earthquake. a, c, e: Water LoS b, d, f: Roading LoS

## Goals and further research

- Gather further datasets and first hand accounts from interviewees.
- Produce more time series analyses to confirm the presence of interdependence in the restoration of infrastructure and services.
- Enhance current infrastructure inventories and hazard maps for the given towns
- Run applicable data through such risk management software as RiskScope

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